7. After the injection of large quantities of bismuth paste into suppurating sinuses, mild symptoms of nitrite intoxication may appear.

8. The bismuth injected into these sinuses and encapsulated will be gradually absorbed and may be found in the liver, spleen, muscles and intestines.

9. Characteristic symptoms of black borders of gums, ulcerations of mucous membranes, diarrhea, desquamative nephritis, may appear several weeks following the injection of the paste.

10. The acute nitrite poisoning is to be regarded as a distinctly separate affection from the more chronic bismuth absorption.

11. Radiographers should employ some other preparation of bismuth instead of the nitrate, and refrain from injections of subnitrate into the bowels, especially if intestinal putrefaction is present.

173 Lake View Avenue.

A DECEPTIVE CASE OF LEPROSY *

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REPORT BY DR. WHITE

In August, 1907, a young woman from Courland, Russia, was referred to the skin department of the Massachusetts General Hospital for diagnosis. She had been treated one week previously in the "throat room" for "chronic rhinitis" and at her second visit blue-red papules had been discovered on her arm and she was consequently referred to us. The diagnosis of leprosy was made and subsequently corroborated by Dr. Richardson's pathologic findings and the girl was taken to the state leprosorium.

A few days later the board of health of Brookline was informed by an anonymous letter that another leper was working as a servant at a certain residence in that town. The members of the board made an immediate investigation at the house mentioned, but found that the young woman in question had disappeared. Two days afterward this suspected individual presented herself voluntarily at the skin clinic of the Massachusetts General Hospital and was sent to the skin ward for observation and study.

History.—The patient, a young woman, aged 19, was born in a village in the Baltic province of Courland.[1] She stated that her father was dead (cause unknown), but that her mother and brothers were alive and well in their native village. At the age of ten a cutaneous eruption appeared, and on its subsidence scars were found on the right elbow, which still exist. In December, 1906, a sore developed on the genitals and was followed by a rash but no evidence of any labial cicatrix was visible at our first examination. In July, 1907, another outbreak on the skin occurred and was treated by a neighboring physician, but unfortunately his testimony could not be secured. During the last year the girl had been well except for occasional headaches. This was all that could be gleaned from the past history of the case. At entrance on Aug. 24, 1907, the patient stated that the present abnormal conditions began five days previously without any known cause, and she denied absolutely that she had taken any medicines before or since the appearance of her present symptoms.

Examination.—The general condition of the girl was fair; temperature 99.4 F., pulse 90, and respiration 25. The pupils were unequal in diameter and irregular in outline. The conjunctiva of the right eye, especially about the cornea, was considerably injected and pain and photophobia were present. The eyebrows were somewhat scanty, particularly at the distal ends. The tongue protruded straight and was covered with a slight, white coat. Cervical, axillary, epitrochlear and inguinal glands were moderately enlarged and shotty to the touch. The neck was not rigid or tender. Examination of the internal organs revealed nothing abnormal save a soft systolic murmur at the apex of the heart which was transmitted but a short distance toward the axilla. The knee jerks were present and equal. The cutaneous eruption, however, proved more interesting. The face was rather generally suffused and edematous and the nose, in particular, seemed swollen. There were no nodules here, but the lateral diameter was evidently increased and this feature persisted throughout the fourteen weeks of observation. In addition to these general appearances the face, forearms, hands and lower legs showed thickly scattered, round, pea to dime-sized, brick-red macules and maculo-papules with bluish centers. The trunk exhibited a few similar lesions. On the lower legs, especially on the extensor surfaces, more advanced lesions were apparent in the nature of numerous pea to dime-sized exulcerations covered with a sero-purulent, sometimes blackish crust.

Diagnosis.—Despite the anonymous letter and despite the long continued intimacy between this girl and her fellow-townswoman, whom we had so recently adjudged a leper, we were inclined to regard this present eruption as a form of autointoxication resembling erythema multiforme (possibly bullosum).

Treatment.—A soothing carbolic acid and zinc wash, boracic acid ointment, Epsom salts, a diet of milk and soft solids and atropin for the eyes were recommended.

Subsequent History.—On Aug. 27, 1907, three days later, the maculo-papular erythema had perceptibly diminished, the temperature was normal and the crusts had fallen but the ocular symptoms were still present, though to a lesser degree, and on the legs the exulcerations were drying up. Here, however, new features were now exposed consisting of several large pea-sized, round, deep, punched-out ulcers and several still larger pigmented scars. One of these chocolate-colored cicatrices was excised and sent to Dr. Richardson for examination as to the presence or absence of acid-fast bacilli. With these apparently typical gummatous ulcers and the presence of a general adenitis before us, coupled with the history of a previous genital sore, we now made the diagnosis of syphilis and began the tri-weekly injections of a sixth of a grain of bichlorid of mercury which were continued until Sept. 28, 1907.

On Aug. 30, 1907, Dr. Richardson reported the finding of numerous acid-fast bacilli in the sections from the cicatrix of the leg. It must be confessed that this finding was a great surprise, but nevertheless from a clinical standpoint, we were unwilling to believe that the disease was leprosy. Under ether a two-inch incision was made over a subcutaneous mass felt about three inches above the left elbow in the region of the ulnar nerve and two large pea-sized nodules, apparently glands, were dissected out. The nerve itself was found to be perfectly normal. In addition, a small crusted lesion was excised from the right leg, half way between the knee and ankle. An examination of the urine showed it to be slightly cloudy, 1.025 in specific gravity, without albumin or sugar, and containing in its sediment a few round cells, a rare blood globule, but no acid-fast bacilli.

On Aug. 31, 1907, the skin was carefully examined for anesthesia but none was found. The rash had now entirely faded, leaving some pigmentation and a slight, superficial, branny desquamation. The blood showed 100 per cent. of hemoglobin, and a differential count of polymorphonuclears 77 per cent., mononuclears 21 per cent., and eosinophiles 2 per cent.

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* Read in the Section on Cutaneous Medicine and Surgery of the American Medical Association, at the Fifty-ninth Annual Session, held in Chicago, June, 1908.

[1] At the Lepra Conference of 1896, it was recorded among other statistics that 134 lepers were known to be living in this province.

Two days later the board of health insisted on transferring the patient to the Detention Hospital, but on the following day, as the result of our protests, and because certain members of the city board of health and of the state board of charities regarded the disease as syphilis, the young woman was returned to our care. On readmittance it was found that the superficial scaling, first observed four days previously, was still present.

On Sept. 5, 1907, Prof. Eric Hoffmann, of Berlin, was kind enough to make a thorough examination of the patient. Nothing was told him about the girl and no mention of the pathologic findings was made until afterwards, and this was the rule followed with all the distinguished foreigners[2] whom we were fortunate enough to be able to call in consultation over this puzzling case. Professor Hoffmann's diagnosis was syphilis, possibly complicated with tuberculosis or a tuberculide. Prof. James C. White studied the case also and made the diagnosis of syphilis. In the afternoon 0.001 gram of old tuberculin was administered subcutaneously.

On Sept. 6, 1907, Prof. Bertarelli and Dr. Pizzini of Milan kindly looked the patient over very carefully and both stated that in their opinion she was suffering from syphilis. They also wished to have borne in mind the possibility of a complicating tuberculosis or a tuberculide. The two-hourly chart kept since the injection of the tuberculin showed no temperature exceeding 99 F. The urinary examination revealed no changes, save a lower specific gravity (1.017) from that of the previous week.

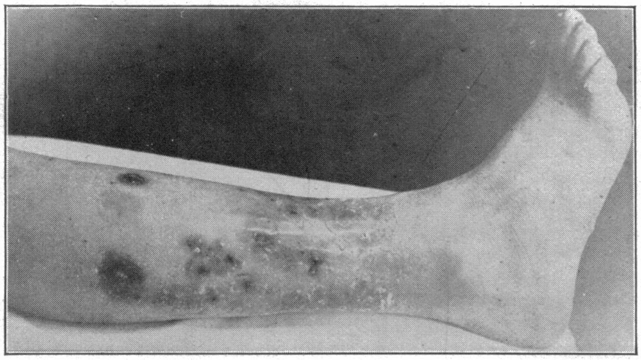

Fig. 1.—Showing the abundance and distribution of the healed ulcers on the lower part of the leg.

On Sept. 10, 1907, the areas of pigmentation were fading away. The patient was bearing well the injections of mercury, but complained somewhat of pain for a few hours after each dose was administered. Dr. A. Quackenboss of the Massachusetts Eye and Ear Infirmary made an ocular examination. He reported that the right eye showed evidence of a previous iritis with one adhesion and several spots on the anterior capsule. The left eye also presented signs of previous iritis.

On Sept. 12, 1907, 0.005 gram of old tuberculin were injected at 5 p. m. The two-hourly chart recorded during the next twenty-four hours, as before, no temperature in excess of 99 F.

On Sept. 16, 1907, Dr. Hallopeau of Paris and Dr. Whitfield of London were good enough to make a thorough examination of the patient and both of these gentlemen were convinced that the girl was the victim of syphilis. In order to study the nasal secretion, 20 grains of iodid of potash t. i. d. were ordered in the hope of producing a coryza.

On the following day, Dr. Radcliffe-Crocker of London came to see the patient, but he had been told of the case and its pathologic details by his compatriot, Dr. Whitfield, and consequently was unwilling to commit himself to a definite opinion. That morning the girl's temperature was 101 F., and in the afternoon it climbed to 102 F. Concomitantly there was a slight return of the erythema and edema of the face and a feeling of general malaise. [In the light of our present maturer conception of this girl's condition, we are inclined to regard this occurrence and the severer earlier outbreak on admission as explosions of leprosy bacilli from some focus into the general circulation rather than a possible reaction from the iodid of potash administered during the previous twenty-four hours.]

On Sept. 18, 1907, Dr. W. R. Brinkerhoff of the government leprosy staff of Honolulu saw the patient and stated that there was no clinical evidence of leprosy except in the scantiness of the eyebrows and in the thickening of the nose. After an examination of the pathologic sections he said that the bacilli seemed shorter and thicker than the leprosy bacilli he was accustomed to see at Molokai, but the tissues and the arrangement of bacilli were very suggestive of leprosy and not at all compatible with our ideas of tuberculosis.

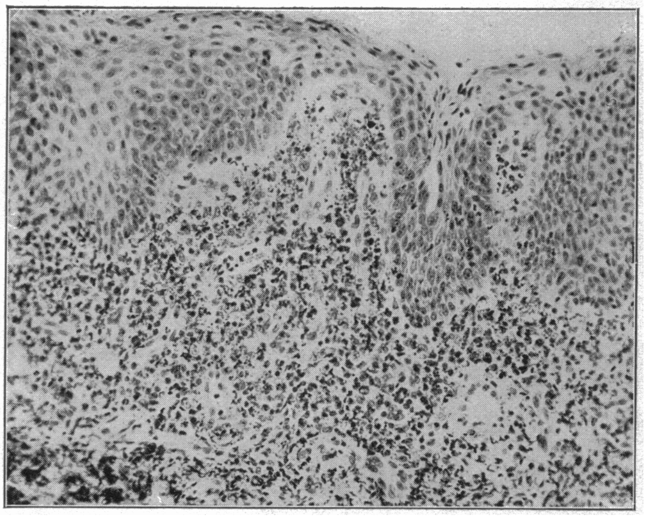

Fig. 2.—Section showing the histopathology of one of the late nasal nodules. Note the unusual development of cells up to the epidermis itself; the absence of giant and of leprous cells; the dilatation of the lymph vessels with their vesicular nuclei.

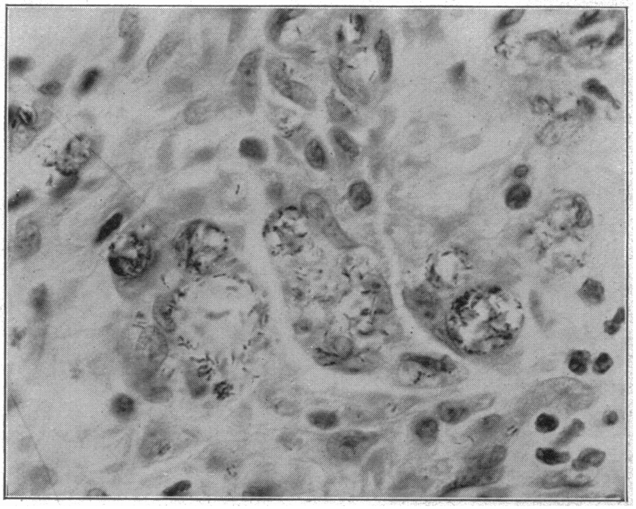

Fig. 3.—Section illustrating three typical leprous cells. Note their dissimilar size and shape, their vacuoles and their numerous bacilli.

There had been no increase of nasal secretion resulting from the administration of iodid of potash and several smears from the nose, stained carefully with hot carbolfuchsin and Gabbet's blue, failed to reveal any acid-fast bacilli. The ulcers on the legs were now healed—twenty-five days after entrance and after ten injections of 1/6 of a grain of bichlorid of mercury—but a very marked pigmentation of the skin remained at their sites.

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[2] Passing through Boston on their way to or from the Sixth International Dermatological Congress.

On Sept. 20, 1907, Dr. H. C. Baldwin of the neurologic staff of the hospital made a careful examination of the sensations of the skin and of the general reflexes, but found nothing abnormal. The weight was now 102 pounds.

On Sept. 27, 1907, two small, hard, pea-sized nodules were noticed for the first time on the right arm, but in the opinion of the patient these lumps had been present for at least a month. They were both hard, not raised above the skin, and were freely movable with the integument. One-sixth of a grain of pilocarpin was injected in order to study the nature of the sweat secretion, but the reaction, although present, was so slight that nothing definite was learned.

On Sept. 29, 1907, under ether, an incision was made over the right elbow and a pea-sized mass lying in contact with the ulnar nerve was excised and sent to Dr. Richardson. At the same time smears were made on various culture media from the juice of this gland. The nerve itself seemed smooth and normal in appearance.

On October 1 the patient passed into the service of Dr. J. T. Bowen, but he kindly allowed us to continue our investigations.

Second Examination.—Two days later we made a systematic clinical examination of the girl. The eyebrows were mostly gone except in the middle. There were no nodules to be felt. The corneæ showed a few dilated veins. The pupils were widely dilated but the circles were not perfect. On the forehead there was one irregularly-circular, rather deep cicatrix. The skin of the nose was somewhat seborrheic, but without dilated follicular orifices. The nose was broad at the alæ. The cheeks were flushed and on them were noted one round-topped, dark red papule with a delicate collarette of exfoliated epithelium and four small, deepish, oval scars. Near the right angle of the mouth, but not radiating from it, were three pin-head, shallow scars. The ears were normal and bore no nodules. The hair was fair in color, distinctly abundant, and not in the least dry. The back showed nothing abnormal, save a few, faint, irregularly distributed macules. The axillæ presented normal and dark hairs and the localized sweating was rather profuse. The skin of the chest was not remarkable except for the presence of numerous, dull-red macules suggesting cutis marmorata. On the left upper arm, near the outer condyle, was found an oval, pea-sized, blue-red scar and on the inner side the marks of the biopsy of Sept. 29, 1907. The left forearm exhibited five, dull red, subsiding papules, some of which could be more aptly designated as scars. The right upper and lower arms were quite similar to the left. The hands were blue and cold and rather moist, but bore no pathologic lesions. On the right buttock were eight fading blue-red papules and scars. The largest papule was firm and infiltrated and three-eighths of an inch in diameter. Seventeen similar, smaller and larger papules were counted on the right thigh. The left buttock presented one blue-red, flat, oval tubercle, slightly infiltrated and firm. The left thigh showed eight blue-red macules with accompanying scar formation. On the right leg were found (Fig. 1) on the inside, front and outside of the middle third, blue-black, round or oval, dry scars, the remains of the previous exulcerations and other antecedent lesions. There was some originally appeared as a typical gummatous ulcer. The feet confluence noted, but no grouping as in typical late syphilis and nearly seventy-five of these cicatrices were counted. The left leg presented a somewhat analogous picture and below the patella was found a circular scar, the remnant of what were normal except for the dryness of the skin.

On Oct. 5, 1907, a nodule was excised from the right ulnar region.

On October 11 the weight was 105 pounds and 6 ounces. Two days later the records state that the patient was up all day, "felt splendid," and had an excellent appetite. This satisfactory condition existed despite the frequent mental perturbations caused by our numerous investigations and despite her compulsory and really almost solitary confinement in her narrow hospital room.

On Oct. 16, 1907, another biopsy was made, this time from a healed, mahogany-colored, smooth scar on the right leg, of a month's duration. On the following day the weight was 107 pounds.

On Oct. 22, 1907, Professor Veiel, of Cannstat, kindly made a most thorough examination of the patient and felt convinced that the lesions on the skin were syphilitic.

On Oct. 25, 1907, Dr. Richardson reported that the sections from the last biopsy were more typical of leprosy than any of their predecessors and that the acid-fast bacilli appeared in greater numbers.

On Oct. 28, 1907, a nasal examination was requested because lesions had been discovered and Dr. H. P. Mosher of the throat department of the hospital reported that the mucous membrane of the nose was rather dry and that a small yellowish tubercle was present on the anterior end of the left inferior turbinate bone. The pharynx and larynx were normal.

On the following day Dr. Algernon Coolidge, the senior physician of the throat department asked to see the patient and found three large pin-head sized points under the epithelium of the mucous membrane on each side of the septum nasi and a similar growth on the anterior end of the left inferior turbinate. One of these lesions was excised. Dr. G. H. Waterman of the neurologic department of the hospital examined the cutaneous reactions of the patient and found nothing abnormal save a slight insensibility to pin prick over the dorsum of both feet. Smears from the nose were stained with steaming carbol fuchsin and Gabbet's blue and for the first time a few grouped and clearly defined bacilli were found.

On Nov. 2, 1907, the weight was 111 pounds and 2 ounces.

On Nov. 19, 1907, an investigation of some of the finer diagnostic points of the disease was made and the following data were obtained:

1. *The presence of hair on the most affected parts of the body:* As a whole, over the legs normal hair existed in sufficient quantities except in the immediate vicinity of the scars, where it appeared only occasionally.
2. *Anesthesia in or near the scars:* None whatever, the most delicate pin prick being appreciated.
3. *The sensibility of the nasal mucous membrane:* This power was absolutely intact.
4. *The condition of the eyes:* The conjunctiva presented a few comparatively large vessels arranged in a radial manner. The iris was round and reacted perfectly to light. There were no nodules to be seen.
5. *Menstruation:* For the first time since entrance the patient menstruated during the first week of November, 1907.
6. *Glandular system:* In the right groin there was a large mass of soft, somewhat sensitive glands. On the left side there was one large soft element. In the left cervical region there was a chain of glands. No epitrochlear enlargements could be felt.

On Nov. 21, 1907, the weight was 116 pounds and 8 ounces. On the next day it was noted that no new cutaneous features had appeared but several minute ulcerations were observed on the mucous membrane of the nasal septum. The general health was most satisfactory.

On Nov. 24, 1907, we felt that the time had come when we could no longer doubt that the girl was a leper and she was therefore reluctantly turned over to the authorities for transfer to the state leprosorium on the island of Penikese.

Such is the detailed history of this unfortunate patient. It is easy enough for us now in the light of our present pathologic and bacteriologic knowledge to pronounce this case leprosy, but let it be well understood that until the nasal symptoms developed the dominant clinical features were not those of leprosy, as may be well appreciated when such distinguished European dermatologists as Bertarelli, Crocker, Hallopeau, Hoffmann, Pizzini, Veiel and Whitfield unanimously declared that the girl was syphilitic. When these gentlemen were informed, after pronouncing their opinions, that the pathologic sections were typical of leprosy they could only shrug their shoulders with astonishment and incredulity.

Let me pause one moment before enumerating the conclusive pathologic details to record what clinical symptoms were present up to the late appearance of the nasal features which should have convinced us that we were dealing with leprosy and not with syphilis. After rather an extensive perusal of leprologic literature, I have been able to record only the following symptoms which coincide with the conditions found in the present case: Place of birth; edema and suffusion of the face, especially of the nose, accompanied by a general seborrhea and small acneiform papules; rarefaction of the eyebrows; conjunctivitis and iritis; general adenitis, cyanosis of the hands; irregular menstruation; ulcerations and, lastly, hyperpigmented scars with local and adjacent alopecia. But what a short and unconvincing list in such a protean disease as leprosy! Not one of these symptoms is pathognomonic and all of them are common to many pathologic processes.

On the other hand, we were confronted by an apparently healthy young girl who entered the hospital partially covered with a fairly typical but severe eruption of erythema multiforme, who later presented one absolutely characteristic gummatous ulceration and many other conceivably syphilitic exulcerations, who quickly freed herself from all these active symptoms after ten injections of mercury and in the face of the constant mental excitement of repeated examinations and biopsies, and who, despite her solitary confinement, gained fourteen and one-half pounds in two months. Such conditions made us extremely skeptical of the microscopic revelations, and until the nose began to develop its convincing symptoms we obstinately rejected the idea of leprosy and, supported by the most expert authorities, clung to the syphilitic conception of the process.

In concluding this part of the paper I wish to thank the various gentlemen whose names have appeared in the preceding pages for their conscientious examinations and diagnostic support, but I also wish to express my gratitude to Drs. Bowen, Towle, Burns, Oliver, C. G. Mixter and R. M. Green, members of our hospital staff, for their kind cooperation in our various investigations.

HISTOPATHOLOGY

The sections which form the basis of the following microscopic details were prepared and stained with carbol fuchsin and hematoxylin by Dr. Richardson, who has kindly allowed me to study them and report my findings.

HISTOLOGIC FINDINGS

1. *Sections from a healing subcutaneous nodular ulceration, excised from the left leg on Aug. 24, 1907.*

Epidermis.—The stratum corneum is very slightly developed and consists of a very fine layer of homogeneous cells free from nuclei. The stratum granulosum is composed of one to four layers of practically normal, keratohyalin-bearing cells. Over the areas where the papillæ are absent these cells are most abundant and in some instances exhibit a tendency toward nuclear shrinkage. The stratum spinosum is somewhat acanthotic and as a whole has stained poorly, for cellular boundaries are difficult to trace and this feature is particularly emphasized throughout the apapillary region. The nuclei for the most part are normal, although they incline somewhat toward hypertrophy. The stratum germinativum is well developed and persistent over the greater extent of the rete and here and there contains delicate pigmentary deposits.

Corium.—The papillary layer is unevenly but well differentiated except for a broad area in the center of the sections where the papillæ are wanting. The papillary vessels are not markedly dilated, but their endothelial cells are often swollen and at times vesicular. The perivascular spaces are crowded with mononuclear cells which in some instances block the entire papillary space. The striking feature of the corium is its rich cellular infiltration which is everywhere noticeable—these elements reaching even to the epidermis in the apapillary portion. [This phenomenon is unusual in the recorded histologic descriptions of the disease]. In addition to this general invasion there are band-like and oval areas, corresponding to vessels and sweat glands and follicles, where the cells appear in far greater abundance. These cells are principally swollen connective tissue cells, mononuclear leucocytes and some plasma cells with an occasional epithelioid element. Bacilli are not numerous, judged by the usual standard of leprosy. The elastic tissue is universally somewhat diminished. Near the epidermis elastin appears as short, broken, coarse fibers. In the cellular foci about the vessels elastin is totally wanting while in the neighborhood of the sweat glands it appears only in the structure of the glands themselves.

Gland from the left epitrochlear region excised on August 30.

The tissue is composed of lymphoid, endothelial and connective tissue cells. The acid-fast bacilli are unevenly distributed but wherever present they appear in great numbers, sometimes singly, but oftener in round or oval masses. As a rule the normal tissue becomes poor in cells in the areas of bacterial distribution and not infrequently vacuoles appear with the bacilli arranged excentrically around the vacuolar membrane. The organisms seldom present themselves as well defined rods but seem to be broken up into series of long dots. Zoogleal formation is abundant and characteristic and frequently the colonies are of great size. Blood vessels are rare but are normal when found. The determination of the intra- or extra-cellular emplacement of the organisms is always difficult to determine, but in the present instance it would seem as though the latter position was usually chosen. The gland is distinctly altered by the invasion of the disease. The acini have lost their identity, the vessels are few in number, the individual cells have vanished in many instances, and finally connective tissue is seen replacing the normal elements.

Healed scar from leg, excised on Aug. 30, 1907.

Epidermis.—The palisade layer of the rete is well differentiated and the cells are normal. The immediately adjacent superficial cells are also sound but in the next layers the normal structure is soon lost and the nuclei shrink and disappear, but the spinous processes of the cells persist. In the granular layer the cells are pale. The stratum corneum is thin, but otherwise normal.

Corium.—Papillæ are gone and vascular twigs are wanting in the immediate vicinity of the epidermis. The subpapillary vessels, however, are present, but decreased to a minimum. Their walls are normal, with the exception of some endothelial vesiculation and no bacteria were noted either intra- or extramurally. A large portion of the sections show marked cellular and bacillary infiltration—the remainder appearing as delicate scar tissue with moderately numerous, slightly swollen connective tissue nuclei. The deeper vessels are few in number and glands and follicles have gone.

The cellular areas are composed of many plasma cells, especially about the vessels, some lymphocytes and connective tissue cells and finally collections of lepra cells which play a dominating rôle in the picture. They are of various shapes and sizes; some elongated, others round or oval; some are anuclear, amorphous masses, others have generally distributed nuclei, and again others show distinct giant cell distribution of nuclei; some have a few vacuoles, others are composed almost entirely of empty spaces; some present zoogleal bacilli and others contain only one or two scattered organisms. Some of the isolated bacteria appear in close proximity to the epidermis, but none are seen in this layer of the skin.

Right epitrochlear gland, excised Sept. 29, 1907.

This gland differs from that of the left side in the relative paucity of its cellular contents. There is no such solid massing of cells—they are more evenly, though meagerly distributed. In addition, there are comparatively large areas from which cells have disappeared, leaving a vacuolar network the trabeculæ of which are usually lined with bacilli. Another striking dissimilarity is in the arrangement and distribution of the bacteria. Here the organisms are more evenly placed throughout the sections and occur usually as single elements or at times in small clumps. They are seldom found in a zoogleal state, but here and there a zooglea is noted in the center of a vacuole.

Once more it is evident that where the bacilli are most numerous there the normal collagenous structure is the poorest. The organisms are nowhere seen in the few vascular walls present. Fibrous tissue is replacing normal structures. Pigment granules, ocher colored or canary-yellow in hue, large or small, are found scattered throughout the sections.

Small sections from the edge of a one-month-old, mahogany-colored, smooth, shining cicatrix, excised from the leg on October 16, 1907.

Epidermis Rete.—The palisade layer is composed of cubical rather than the ordinary elongated cells. No pigment is found here or elsewhere in the epidermis. The overlying cells become almost immediately horizontal and compact, the spinous processes being rather inconspicuous and the nuclei in many instances being absent or again relatively prominent on account of the retraction of the surrounding cell protoplasm. The granular layer is comparatively thick and its cells also have lost some of their nuclei. The stratum corneum is also comparatively broad, in places compact, while in others the cells are expanded into a loose meshwork of six or seven layers of anucleated cells.

Corium.—The papillar layer is entirely wanting and the corium as a whole is composed of a dense structure of fibrous tissue containing numerous nuclei and supporting scattered upright vessels, some large dilated lymph spaces, abundant brilliant, ocher colored pigment granules and some sweat glands and ducts. The perivascular infiltrations are not marked except in the subcutaneous fat spaces and in the deeper layers of the corium, but here and around the sweat glands there are very prominent infiltrations composed of plasma cells and lymphocytes, with occasional connective tissue cells, the whole lying in a loose connective tissue reticulation. Except, therefore, in the deepest layers of the corium there are no suggestions of lepromata.

The study of the elastic tissue reveals a strange condition. The larger half of each section shows an excessively abundant normal elastin while the remaining portion is apparently altogether devoid of this element. I can offer no explanation for this phenomenon as the supporting collagen presents no other apparent abnormalities.

The preceding description of the corium affords a good idea of the distribution of the acid-fast bacilli. Where the lepromata appear, there one finds the organisms and the deeper in the sections one looks the more abundant become the bacteria. Therefore, in the upper corium no bacilli are found, in the middle strata an occasional short rod is noted, while in the depths of the layer around the vessels and especially in the subcutaneous fat closely packed, small clumps of the bacilli appear. The individual elements are for the most part short, thick rods while many dots, sometimes in long rows, complete the picture.

Nodule from the lower left turbinate, excised Oct. 29, 1907.

Epidermis.—The epidermis is well preserved in its lower layers. The cells are in the majority of instances well-formed, although the spines are indistinct and the nuclei everywhere emphatically vesicular with prominent nucleoli and numerous chromatin granules. Here and there appear areas of cloudy degeneration with accompanying disturbance or disappearance of nuclei. Karyokinesis is normally abundant throughout the layer. As the free surface is approached cells become amorphous and nuclei vanish.

Here for the first time in this series of sections lepra bacilli are visible in the epidermis. They exist as single, scattered elements or appear in foci, isolated or in small zoogleal, round groups. They are in all instances well preserved and are found at all levels of the epidermis. At one point a cell was observed with a beginning vacuole lying close to the nucleus and containing a clump of bacilli. In some areas it was thought that cellular degeneration and richness in bacteria went hand in hand, but for the most part the germ-bearing cells were well preserved. Interpapillary downgrowths of the rete were abundant here and there, becoming hair follicles containing bacilli within their walls.

Corium.—The picture here is extremely interesting, illustrating as it does the typical young leproma. Here lepra cells are absent and giant cells are represented by one example in fifteen sections. On the other hand bacilli are swarming in enormous numbers, the red coloring of the bacteria being almost as conspicuous as the blue-stained cellular elements. The structure is one of intense infiltration, the nature of the cells being difficult to determine. They are composed of oval or round vesicular nuclei containing numerous chromatin granules surrounded by a small amount of dull protoplasm, the individual cell outlines being hazily demarcated. Whether these elements are distorted connective tissue cells or whether they are lymphocytes is a perplexing question to answer. In addition there are a few polynuclear leucocytes and a very occasional plasma cell.

The papillæ are prominent and support very minute vessels containing bacilli intramurally and an occasional bacillus in their lumen. Otherwise, the papillæ are filled with the indeterminate, mononucleated cells just described. There is a marked tendency in these papillæ toward fatty degeneration, the cells being represented by hollow, yellow spheres bearing an infrequent bacillus but no nuclei. The leproma is practically contiguous with the epidermis—an unusual condition.

Throughout the corium there are a very few contracted blood vessels with somewhat vesicular nuclei and here and there a few bacilli. The lymph channels, however, are numerous and frequently form widely dilated spaces with round vesicular nuclei in their walls, and contain single or grouped bacilli and occasional erythrocytes and mononuclear leucocytes.

In the depths of the sections there are areas of degenerated collagen and elastin, but the sweat glands preserve their integrity and contain no bacilli. The bacillary invasion is extremely marked, the organisms appearing singly or in groups, intra- or extra-cellular, and often in the zoogleal state within a round or oval lymph space or else lining these cavities. The unique giant cell noted in these sections contained no bacilli. These acid-fast bacilli everywhere retained the fuchsin uniformly, no interruptions or dotlike structures being visible and this condition betokens their youth and activity.

In conclusion, I wish to thank Mr. L. S. Brown, photomicrographer to the Massachusetts General Hospital, for the two excellent photographs which illustrated so clearly some of the salient points in the histology of this case.

PATHOLOGIC REPORT BY DR. RICHARDSON

The foregoing record of a case of leprosy in the skin ward of this hospital during the service of Dr. C. J. White has many points of interest, one of which emphasizes the value of extended pathologic investigations in the study of the disease.

As Dr. White has stated, I examined in August, 1907, sections from a nodule in the skin taken from a case which clinically Dr. White diagnosed as leprosy (first case). The pathologic examination amply confirmed his diagnosis.

A short time after this examination I received from Dr. White another piece of tissue which had been removed from the margin of an ulcer on the leg of a young woman who had just been admitted to the skin ward (second case). The tissue was hardened, sections cut and stained and report was made that the sections showed acid-fast bacilli and were quite comparable in other respects with sections of tissue removed from typical cases of leprosy.

This report necessitates further study of the case because clinically it was decidedly not one which would be diagnosed as leprosy. With Dr. White's cooperation portions of tissue from various parts of the body were examined and culture experiments and animal inoculations were undertaken. The results of these investigations were as follows:

Aërobic and anaërobic cultures were made on various kinds of media, as well as on egg medium and other media suitable for the growth of the tubercle bacillus. Cultures were also made in neutral 2 per cent. glucose agar. In this medium an Italian investigator (Campana) recently claims to have been able to obtain a growth of the lepra bacillus.

The tissue material planted in the various kinds of media was obtained under aseptic precautions and the cultures were made by Dr. J. H. Wright. Portions of the tissues used for inoculation of the culture media were hardened and stained and on examination the sections all showed numerous acid-fast bacilli, thus demonstrating the presence of the bacilli in the tissues used for the inoculation purposes.

The various cultures were under observation over a long period of time, but no growth was ever obtained. Other portions of the tissue material used for culture inoculation were placed in the subcutaneous tissues of a large normal guinea-pig and the skin wound closed with sutures. The pig never showed any signs of infection after the inoculation and was allowed to live fifty-seven days, when it was killed. The autopsy showed a normal animal and it was with difficulty that the scar of the inoculation wound could be made out. The inoculation material had apparently been absorbed.

The question of syphilis having been raised, sections from various situations were hardened and stained by the silver salt method, but no spirochetes were ever found.

Many portions of tissue were taken at different times from widely distant parts of the body, and finally a minute piece was excised from the mucous membrane of the nose. The sections from these tissues all showed more or less well-marked chronic inflammatory and degenerative changes, with varying numbers of the so-called lepra cells and acid-fast bacilli. In instances the lepra cells were very numerous and acid-fast bacilli swarmed in these cells and in the subcutaneous tissues.

Dr. White has recorded the histologic details of many of the sections, and I have only to call attention again to a few of the more interesting points.

The presence of the acid-fast bacilli in the cells of the epithelium is well shown in some of the sections, and the so-called lepra cells are notable both for the great variation in their size and for the great numbers of bacilli which they contain. In instances these lepra cells are not unlike giant cells and many of them present a vacuolated appearance. As to what these cells are it is difficult to say, but from their situation in the tissues and their relation to the lymph spaces it is probable that they are endothelial in origin.

In regard to the presence of the bacilli in the cells of the epithelium, it may be said that they have probably reached these cells by way of the lymph stream and possibly some of them may have been carried by leucocytes. In certain sections it is interesting to note the persistence of the bacilli in the subcutaneous tissues beneath the epithelium of one of the healed ulcers. Outwardly the lesion has run its course and is healed, but the section shows the bacilli resting in the subcutaneous tissue biding their time.

It is of interest that only late in the history of the observation of this case were acid-fast bacilli found in the nasal secretion, which, to say the least, is unusual.

The bacilli themselves require but little comment. They are acid-fast, but not so much so as the tubercle bacillus, which they resemble morphologically, and they stain well enough by Gram's method. The slight variation in their morphology is of assistance in ruling out the tubercle bacillus and making it probable that we have to do with the lepra bacillus. We failed completely in our attempts to grow them and they produced no effect whatever on the inoculated guinea-pig.

The pathologic examination of the lesions in this case thus shows both histologically and bacteriologically that these lesions are in all respects comparable with and like similar lesions in individuals who clinically are undoubted lepers. The histologic character of the lesions and the biologic character of the bacillus present in them are also in harmony with those first described as present in leprosy by Hansen in 1871 and since then confirmed and amplified by many investigators.

It remains to be said that recently this unfortunate young woman whose case we have here recorded was sent back by the state to Courland, Russia, as a leper.

I am indebted to Dr. White and Dr. Bowen for much kind cooperation and assistance in the study of the case, and I also am under obligations to Dr. Oliver, house officer in the skin ward, for much assistance during the investigations of this case.

ABSTRACT OF DISCUSSION

DR. JOHN A. FORDYCE, New York: This carefully reported case illustrates the resemblance between the various forms of the infective granulomata. The more we study the cutaneous manifestations of tuberculosis the more we appreciate their similarity to the syphilides, and the same is true of leprosy. Some of the tuberculides, too, are very similar to papulopustular syphilitic lesions. I recall a case of leprosy in which the lesions responded to hypodermic injections of mercury in very much the same way as in Dr. White's case. A man from South America came to the City Hospital with pigmentations on the skin; these had been the sites of infiltration which had disappeared under injections of mercury, and the diagnosis of this case was difficult until the subsequent development of other lesions took place, rendering the real nature of the affection fairly clear.

Another case which recently came to the notice of the Health Department of the City of New York was regarded by the health authorities and by several dermatologists as one of multiple sarcoma. The patient, a man from Courland, had purplish lesions about the ankles identical with those described in Kaposi's hemorrhagic sarcoma. One of these was excised and examined by two expert pathologists, who pronounced it sarcoma, but they failed to look for the lepra bacillus, which was subsequently found in enormous numbers.

Multiplying Words Without Knowledge?—In the Harveian oration, Dr. J. A. Omerod (*Lancet*, London, Oct. 24, 1908, p. 1202) says: "Thus it has been supposed on the analogy of other facts, that hemophilia is a character which becomes dominant or recessive according as the sex of the person is male or female, and that this accounts for the rarity of female bleeders."

Cf. Molière: *Le Malade Imaginaire:* Intermède.

Primus Doctor: Domandabo causam et rationem quare opium facit dormire.

Bachelierus: Quia est in eo virtus dormitiva. Etc.

Another illustration of this was found in a manuscript recently submitted to THE JOURNAL for publication, at the close of which the author enumerated the advantages of his method, and gave as the first advantage: "1. Its marked superiority over any other method.'